

Case 3492***Heliconius tristero* Brower, 1996 and *Heliconius melpomene mocoa* Brower, 1996 (Lepidoptera, NYMPHALIDAE): proposed conservation by suppression of *Heliconius melpomene bellula* Brown, 1979**

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Abstract. The purpose of this application, under Articles 23.9.3 and 81.2.3 of the Code, is to conserve the species-group names *Heliconius tristero* Brower, 1996 and *Heliconius melpomene mocoa* Brower, 1996 (Lepidoptera: NYMPHALIDAE) for mimetic butterflies from the Putumayo region of southeastern Colombia by suppressing the senior name *Heliconius melpomene bellula* Brown, 1979. The authorship of this name is convoluted, *bellula* having been originally proposed as an unavailable quadri-nomen and made available by Brown (1979). More significantly, because the implied holotype of *Heliconius melpomene bellula* Brown, 1979 does not belong taxonomically to the species whose oldest available name is *Heliconius melpomene* (Linnaeus, 1764), *H. melpomene bellula* Brown, 1979 is not a subjective synonym of *H. melpomene* (Linnaeus, 1764). Strict application of the Code would synonymise *H. tristero* Brower, 1996 with *H. bellula* Brown, 1979 and retain *H. melpomene mocoa* Brower, 1996 as a valid name. That action would reverse the current application of nomenclature for these taxa as published in numerous recent papers and result in significant confusion. Furthermore, given current disagreement among authors as to the taxonomic status of the specimen associated with the description of the name *bellula*, future nomenclatural instability is likely if the name is maintained. It is therefore proposed that the name *Heliconius tristero* be conserved and the name *Heliconius bellula* be suppressed.

Keywords. Nomenclature; taxonomy; Insecta; Lepidoptera; NYMPHALIDAE; *Heliconius*; *Heliconius tristero*; *Heliconius melpomene mocoa*; *Heliconius melpomene bellula*; butterflies; Colombia.

1. Stichel (1923) described a single specimen of *Heliconius amaryllis amaryllis* C. & R. Felder, 1862, with the name *Heliconius amaryllis amaryllis* Forma *bellula* from the vicinity of Mocoa in the upper Putumayo region of southeastern Colombia. *Heliconius amaryllis* is currently viewed as a geographical race or subspecies of *Heliconius melpomene* (Linnaeus, 1758) (cf. Ackery & Smiles, 1976; Lamas, 2004), occurring in the Huallaga Valley of northeastern Peru (Brown, 1979; Sheppard et al., 1985; Mallet & Barton, 1989). As a quadri-nomen, the name *Heliconius amaryllis amaryllis* Forma *bellula* Stichel, 1923 is infrasubspecific and unavailable (Articles 10.2, 45.5 of the Code – Infrasubspecific names), and cannot be made available from its original publication by the regulations in any other Article of the Code, except by

a Commission's ruling (Article 45.5.1 of the Code). The provisions of Article 45.6 are not relevant in this case as they deal only with names following a binomen, while 'bellula' is following a trinomen.

2. Lamas (1998) asserted that under Articles 10c, 23j, 50c of the 3rd Edition of the Code (1985), Turner (1971) made available and became author of the name *Heliconius melpomene bellula*, based on his listing of the name 'bellula (?)' as a geographical race of *Heliconius melpomene* in a figure legend. However, Turner (1971) did not mention the name *bellula* anywhere else in the book chapter, and his listing of the name in the figure legend provided neither a description of the taxon (Article 13.ai), nor citation of a previous author's description (or even indication of Stichel as the author) (Article 13a.ii). Therefore, Turner's use of the name does not satisfy the criteria of availability stated in Article 13.1 (13a of the 1985 Code), and *Heliconius melpomene bellula* Turner, 1971 is a nomen nudum.

3. Brown (1979, Appendix 3, p. 117) made available and became the author of the name *Heliconius melpomene bellula* by treating it as a subspecies of *Heliconius melpomene* and citing Stichel (1923) (Articles 10.2, 13.1.2, 45.5.1, 50.3.1 of the Code – Authorship of an infrasubspecific name), which by implication made Stichel's original specimen the holotype of the new nominal taxon (Articles 72.5.6, 73.1.2 of the Code – Eligibility as name-bearing types). Subsequent authors (e.g. Sheppard et al., 1985; Mallet, 1993; Holzinger & Holzinger, 1994; Brower, 1996b) applied the name to the geographical race of *H. melpomene* from southeastern Colombia, and followed Brown (1979) in attributing authorship to Stichel (1923). The specimen described by Stichel (1923) became the holotype of *H. melpomene bellula* Brown, 1979 by monotypy (Article 73.1.2).

4. Brower (1996a) discovered based on mitochondrial DNA sequences that the then-current taxonomic concept of '*Heliconius melpomene bellula*' comprised two taxa – a subspecies of *H. melpomene* and a relative of the clade comprising *Heliconius cydno* Doubleday, 1847, *H. heurippa* Hewitson, [1854] and *H. timareta* Hewitson, 1867. Brower described and illustrated the former as *H. melpomene mocoa* and the latter as *Heliconius tristero*, and also examined and illustrated the holotype of Brown's *bellula* (= Stichel's single specimen). There is some suggestion that *H. tristero* was among the first species to be discovered and diagnosed by a combination of morphological features and DNA sequences. Brower pointed out two salient features of the Stichel specimen: that its genitalia imply it is related to the *cydno* group of species, and that its wing-pattern markings suggest that it is a hybrid backcross between *H. tristero* and another member of the *cydno* group. This interpretation is supported by the observation that Stichel (1923) first diagnosed the 'typical' form of *H. amaryllis amaryllis* Felder and then described Forma *bellula* as a variant of it with yellow spots on the forewings (see Brower, 2000).

5. Lamas (1998) published a critique of Brower's (1996a) taxonomic determinations, citing the Glossary of the 1985 Code 'the progeny of two individuals belonging to different subspecies of the same species are not hybrids') to argue that the name *bellula* could not be denied validity under Article 23h on the basis of its putative hybrid origin. Lamas synonymised *H. melpomene mocoa* Brower, 1996 with *H. melpomene bellula*, the species he attributed to Turner, 1971. Lamas repeated this synonymy in his widely-used checklist of Neotropical butterflies (Lamas, 2004) (see 2 and 3 above for a revised view on authorship and typification).

6. Brower (2000) published a response to Lamas (1998), again pointing out that Stichel's specimen, the holotype of *H. melpomene bellula* Brown, 1979, was not taxonomically an example of *H. melpomene*. Thus, Lamas' (1998) synonymy was incorrect. Lamas (1998) rejected Brower's (1996a) hypothesis of a hybrid origin of Stichel's specimen because no other relatives of *H. tristero* were then known from the vicinity of Mocoa. However, there is now evidence for additional cryptic *cydno* group taxa masquerading as other *melpomene* races in adjacent regions both north and south of Mocoa (Giraldo et al., 2008; Jiggins et al., unpublished data) that could provide alleles resulting in the putative hybrid wing-pattern elements observed in Stichel's specimen of *bellula*. Brower (2000) presented formal synonymies of the names *mocoa* and *bellula* and also addressed the taxonomic status of the *bellula* specimen as a 'hybrid'. Of course, given its age, the morphological attributes of this specimen cannot be corroborated by evidence from DNA, as have the taxonomic identities of the types of the names described by Brower (1996a). Note that although the name *bellula* Brown, 1979 would be excluded from zoological nomenclature under Article 1.3.3 if its holotype were deemed taxonomically to be a hybrid, the argument presented in this petition assumes that the name is available.

7. Subsequent authors (Brower & Egan, 1997; Mallet et al., 1998, 2007; Shaw, 1998; Penz, 1999; Brower, 2002, 2006; Gilbert, 2003; Lamas, 2004; Bull et al., 2006; Beltrán et al., 2007; Kronforst et al., 2007; Giraldo et al., 2008; Jiggins, 2008; Mallet, 2009) as well as numerous websites have universally employed the name *H. tristero* Brower, 1996 to refer to the relative of the *cydno* group, and *H. melpomene bellula* Turner, 1971 or *H. melpomene mocoa* Brower, 1996 for the subspecies of *H. melpomene*. This species complex is the subject of intense research due to the hypothesis of 'hybrid speciation' (cf. Mávarez et al., 2006), and the patterns of relationships among the taxa are already confused enough without a needless nomenclatural muddle. A list of 28 published and electronic examples of usage is held by the Commission Secretariat.

8. If the provisions of the Code are followed and the name *bellula* is available, then *Heliconius tristero* Brower, 1996 is a junior subjective synonym of *Heliconius bellula* Brown, 1979 (which is not taxonomically a member of the species *Heliconius melpomene*), while the name *Heliconius melpomene mocoa* Brower, 1996 is the only available name for the entity traditionally called *H. melpomene bellula*. This reversal of current usage is not satisfactory for the reasons indicated above.

9. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to suppress the name *bellula* Brown, 1979, as published in the trinomen *Heliconius melpomene bellula*, for the purposes of the Principle of Priority but not for those of the Principle of Homonymy;
- (2) to place on the Official List of Specific Names in Zoology the following names:
 - (a) *tristero* Brower, 1996, as published in the binomen *Heliconius tristero*;
 - (b) *mocoa* Brower, 1996, as published in the trinomen *Heliconius melpomene mocoa*;
- (3) to place on the Official Index of Rejected and Invalid Specific Names in Zoology the name *bellula* Brown, 1979, as published in the trinomen *Heliconius melpomene bellula* (senior subjective synonym of *Heliconius tristero* Brower, 1996) and as suppressed in (1) above.

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